

(iii) Materials that have a potential to ignite used in each component or part with their MSHA approval number; and

(iv) A statement that the component or part is compatible with other components and, upon replacement, is equivalent to the original component or part.

(3) The capacity and duration (the number of persons it is designed to maintain and for how long) of the refuge alternative or component on a per-person per-hour basis.

(4) The length, width, and height of the space required for storage of each component.

(b) The application for approval of the refuge alternative shall include the following:

(1) A description of the breathable air component, including drawings, air-supply sources, piping, regulators, and controls.

(2) The maximum volume, excluding the airlock; the dimensions of floor space and volume provided for each person using the refuge alternative; and the floor space and volume of the airlock.

(3) The maximum positive pressures in the interior space and the airlock and a description of the means used to limit or control the positive pressure.

(4) The maximum allowable apparent temperature of the interior space and the airlock and the means to control the apparent temperature.

(5) The maximum mine air temperature under which the refuge alternative is designed to operate when the unit is fully occupied.

(6) Drawings that show the features of each component and contain sufficient information to document compliance with the technical requirements.

(7) A manual that contains sufficient detail for each refuge alternative or component addressing in-mine transportation, operation, and maintenance of the unit.

(8) A summary of the procedures for deploying refuge alternatives.

(9) A summary of the procedures for using the refuge alternative.

(10) The results of inspections, evaluations, calculations, and tests conducted under this subpart.

(c) The application for approval of the air-monitoring component shall specify the following:

(1) The operating range, type of sensor, gas or gases measured, and environmental limitations, including the cross-sensitivity to other gases, of each detector or device in the air-monitoring component.

(2) The procedure for operation of the individual devices so that they function as necessary to test gas concentrations over a 96-hour period.

(3) The procedures for monitoring and maintaining breathable air in the airlock, before and after purging.

(4) The instructions for determining the quality of the atmosphere in the airlock and refuge alternative interior and a means to maintain breathable air in the airlock.

(d) The application for approval of the harmful gas removal component shall specify the following:

(1) The volume of breathable air available for removing harmful gas both at start-up and while persons enter through the airlock.

(2) The maximum volume of each gas that the component is designed to remove on a per-person per-hour basis.

**§ 7.504 Refuge alternatives and components; general requirements.**

(a) *Refuge alternatives and components:*

(1) Electrical components that are exposed to the mine atmosphere shall be approved as intrinsically safe for use. Electrical components located inside the refuge alternative shall be either approved as intrinsically safe or approved as permissible.

(2) Shall not produce continuous noise levels in excess of 85 dBA in the structure's interior.

(3) Shall not liberate harmful or irritating gases or particulates into the structure's interior or airlock.

(4) Shall be designed so that the refuge alternative can be safely moved with the use of appropriate devices such as tow bars.

(5) Shall be designed to withstand forces from collision of the refuge alternative structure during transport or handling.

(b) The apparent temperature in the structure shall be controlled as follows:

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(1) When used in accordance with the manufacturer's instructions and defined limitations, the apparent temperature in the fully occupied refuge alternative shall not exceed 95 degrees Fahrenheit (°F).

(2) Tests shall be conducted to determine the maximum apparent temperature in the refuge alternative when used at maximum occupancy and in conjunction with required components. Test results including calculations shall be reported in the application.

(c) The refuge alternative shall include:

(1) A two-way communication facility that is a part of the mine communication system, which can be used from inside the refuge alternative; and accommodations for an additional communication system and other requirements as defined in the communications portion of the operator's approved Emergency Response Plan.

(2) Lighting sufficient for persons to perform tasks.

(3) A means to contain human waste effectively and minimize objectionable odors.

(4) First aid supplies.

(5) Materials, parts, and tools for repair of components.

(6) A fire extinguisher that—

(i) Meets the requirements for portable fire extinguishers used in underground coal mines under part 75;

(ii) Is appropriate for extinguishing fires involving the chemicals used for harmful gas removal; and

(iii) Uses a low-toxicity extinguishing agent that does not produce a hazardous by-product when deployed.

(d) Containers used for storage of refuge alternative components or provisions shall be—

(1) Airtight, waterproof, and rodent-proof;

(2) Easy to open and close without the use of tools; and

(3) Conspicuously marked with an expiration date and instructions for use.

### § 7.505 Structural components.

(a) The structure shall—

(1) Provide at least 15 square feet of floor space per person and 30 to 60 cubic feet of volume per person according to the following chart. The airlock can be included in the space and volume if

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waste is disposed outside the refuge alternative.

| Mining height<br>(inches) | Unrestricted<br>volume<br>(cubic feet)<br>per person * |
|---------------------------|--|
| 36 or less .....          | 30   |
| >36–≤42 .....             | 37.5   |
| >42–≤48 .....             | 45   |
| >48–≤54 .....             | 52.5   |
| >54 .....                 | 60   |

\* Includes an adjustment of 12 inches for clearances.

(2) Include storage space that secures and protects the components during transportation and that permits ready access to components for maintenance examinations.

(3) Include an airlock that creates a barrier and isolates the interior space from the mine atmosphere, except for a refuge alternative capable of maintaining adequate positive pressure.

(i) The airlock shall be designed for multiple uses to accommodate the structure's maximum occupancy.

(ii) The airlock shall be configured to accommodate a stretcher without compromising its function.

(4) Be designed and made to withstand 15 pounds per square inch (psi) overpressure for 0.2 seconds prior to deployment.

(5) Be designed and made to withstand exposure to a flash fire of 300 °F for 3 seconds prior to deployment.

(6) Be made with materials that do not have a potential to ignite or are MSHA-approved.

(7) Be made from reinforced material that has sufficient durability to withstand routine handling and resist puncture and tearing during deployment and use.

(8) Be guarded or reinforced to prevent damage to the structure that would hinder deployment, entry, or use.

(9) Permit measurement of outside gas concentrations without exiting the structure or allowing entry of the outside atmosphere.

(b) Inspections or tests shall be conducted as follows:

(1) A test shall be conducted to demonstrate that trained persons can fully deploy the structure, without the use of tools, within 10 minutes of reaching the refuge alternative.